Calculus Warm Up # 7-2

Find the volume of the region bounded by the following equations and rotated about the given line.

$y = \sqrt{x}$, $y = 2$, $x = 0$,

revolve about: a) x-axis b) y-axis c) $x = -1$

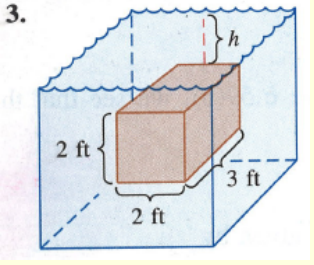
HW Questions: p. 337

In Exercises 1 and 2, find the fluid force on the top side of the metal sheet of given area submerged horizontally in 5 feet of water.

1. 3 square feet

In Exercises 3 and 4, find the **buoyant force** of a rectangular solid of given dimensions submerged in water so that the top side is parallel to the surface of the water. The buoyant force is the difference between the fluid forces on the top and bottom sides of the solid.

3.



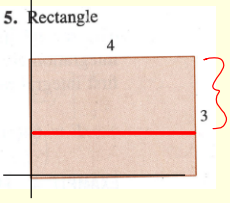
bottom − top

$62.4(h+2)(6) - 62.4(h)(6)$

$6(62.4)(h+2-h)$

In Exercises 5–10, find the fluid force on the indicated vertical side of a tank. Assume that the tank is full of water.

5. Rectangle

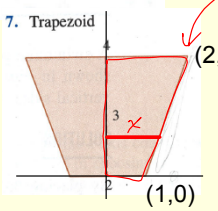


$F = (\text{pressure})(\text{area})$

$= (62.4)(3-y)(4)(\Delta y)$

$F = (62.4)(4)\int_0^3 (3-y)\,dy$

7. Trapezoid



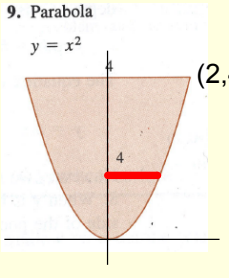
$x = \frac{y}{3} + 1$

$F = 2(62.4)\int_0^3 (3-y)\left(\frac{y}{3}+1\right)dy$

$F = 124.8\int_0^3 \left(3 - \frac{y^2}{3}\right)dy$

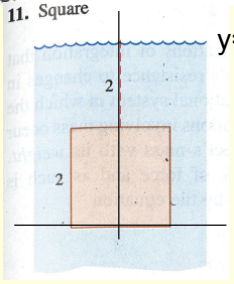
9. Parabola

$y = x^2$



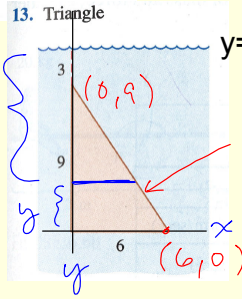
In Exercises 11–14, find the fluid force on the given vertical plates submerged in water.

11. Square



y=4

13. Triangle



y=12

$12 - y$

$y = -\frac{3}{2}x + 9$

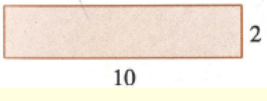
$x = -\frac{2}{3}(y - 9)$

$$F = \int_0^9 (62.4)(12 - y)\left(-\frac{2}{3}(y - 9)\right) dy$$

$$= -41.6 \int_0^9 (-y^2 + 21y - 108)\, dy$$

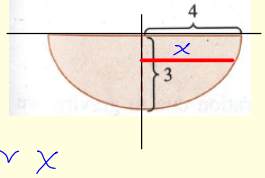
In Exercises 15–18, the given vertical plate is the side of a form for poured concrete that weighs 140.7 pounds per cubic foot. Determine the fluid force on the plate.

15. Rectangle



17. Semiellipse

$y = -\frac{3}{4}\sqrt{16 - x^2}$



$-y$ depth

Solve for x

$$F = 2\int_{-3}^{0}$$

HW: p. 354 Ch. 6 Review

1 - 9 odd, 15, 21, 23, 25, 29, 38, 39

Ch. 6 Test: Thursday